

Richmond Refinery 1st Quarter 2007 Turnaround Lessons Learned

Agenda

Objective:

Review lessons learned
Gain concurrence

Safety topic

Matt

Background

Dale

Lessons Learned

- Core team staffing
- Procedure validation
- Alignment of support programs
- Cost tracking
- QA and PSSR

Mark
Alan
Craig
Steve
Jim

Quick wins

Matt

Discuss handoffs and ownership

Group

Refinery Input To Lessons Learned

Contributions by a broad cross-section of refinery personnel

▪ 19 focus groups

- Operators (3)
- IMPACT Core Teams (3)
- TA Maintenance (2)
- Safety
- Finance & Procurement
- Environmental
- ABU Leadership Teams (2)
- Reliability and Technical (2)
- Turbo Project Team
- Contractors
- CURE
- Maintenance Support

▪ 140 personnel

▪ 1200 comments

▪ 19 validation interviews

The challenge is to condense this input into meaningful next steps

Assessment Team Members

- Craig Dillon-Lead Shutdown Engineer
- Alan Lowell-Machine Shop & IMI Supervisor
- Steve Costa-IMPACT Maint Supervisor
- Chris Oconnor- Hydro Area Supervisor
- Matt Kelley- Safety
- Dale Blume-Plant Inspector
- Jim Zarbis- D&R Area Supervisor
- Mark Radtke- IMPACT Team Leader

Focus Group Feedback Themes

Work definition	370
➤ Work packages, operating procedures, loto, testing guidance	
Work integration/information exchange	190
➤ Project, IMPACT, Ops, Technical, Reliability	
Quality of work	150
➤ Pressure boundary integrity, testing, inspection, QA/QC, PSSR	
Contractor selection	145
➤ Supervisor continuity, CSR, reporting	
Job continuity	120
➤ P3 update, turnovers, decision making, work management	
Resource availability	100
➤ Chevron personnel, contractor workforce	
Material/equipment	90
➤ Parts, tracking, equipment, storage, supplies, monitoring equipment	
Scope freeze to pull feed	40
➤ TAW, cost tracking, include right work	

Survey Says..... and Data Confirms

What Worked Well:

- Safety performance
- Delivered planned scope while coping with unexpected circumstances
- Majority of contractors performed well
- CURE and Crude Unit integration
- A-train and RLOP flare execution
- Resource versatility

Opportunities:

- Core team staffing
- Procedural validation and deliverable ownership
- Alignment of supporting programs
- Cost tracking after scope freeze
- QA and PSSR execution

Quick Wins

Core Team Staffing

Inconsistent staffing of core teams

Examples

Plus

- A-train experienced personnel with multiple Hydrogen train SD's
- Core teams able to adapt to recovery plans

Delta

- Phases 2 / 3: Maint. Supervisors and Planners committed to other SD's (FCC & TKN)
- Capital Projects: Did not have a dedicated planner assigned to TURBO - late integration into IMPACT - not able to optimize
- Shutdown Coordinator often unavailable due to daily operating needs

Impact

- Required recovery plans generated large resource peaks to meet 12/9/4 milestones
- Late staffing shifted focus mainly to critical path work at the expense of other work
- Work with less planning attention than critical path went long and cost more
- Continued RLOP SD preparation thru Christmas - resulting in an additional \$1MM
- Variability calculator: Work packages not completed on time - 2 days and \$2MM

Recommendations

- Analyze staffing requirements to more effectively meet 12/9/4 milestones
- Establish and dedicate core team resources earlier to avoid high peak resource profile
- Develop plan to increase experience in new IMPACT resources
- Capital project planner integrated into core team per IMPACT process

Procedure Validation & Deliverable Ownership

Consistent ABU leadership needed throughout IMPACT cycle

Examples

Plus

- D&R Ops Management drove MOC, PSSR and start-up of 4CU

Delta

- RLOP and 4CU clean-up procedures 1-2 months late
- D&R changing temporary piping multiple times
- RLOP temporary piping just-in-time
- Clean-up procedures not effectively validated by crews
- Day to night shift transition resulted in clean-up priority changes

Impact

- D&R temporary piping changes \$150K, N2 pumper \$200K
- RLOP plant clean-up delays ranging from 1-5 days, \$1-3MM
- Inconsistent priorities and clean-up methods delayed turnover of plants

Recommendations

- Review IMPACT RACI for Operations deliverables
- Evaluate Ops S/D coordinator reporting structure (ABU vs. IMPACT)
- Drive C/U and S/U procedure validation with crews
- Establish methods to assure consistent shift-to-shift objectives

Alignment of Supporting Programs

Inputs to TA scope not aligned with IMPACT milestones

Examples

Plus

- IPR for JHT & NHT successfully integrated into worklist
- D&R relief study completed ahead of time, good screening by ABU for TA worklist
- CUI good program adopted late in TA planning process

Delta

- Utility system CUI not monitored
- CUI generated high extra work cost
- OSI was on a 5 year remaining life look ahead vs. TA cycle
- ROI MK-1900 replacement and C-820 internal inspection submitted after scope freeze
- GR-800 implementation created confusion and rework

Impact

- 4 CU increased overtime (double time vs. straight time) pre-shutdown - \$260K
- Late revisions of procedures, EWO's, P3, CSR and blind lists

Recommendations

- OSI shift to TA cycle alignment (working)
- Synchronize recommendations to meet IMPACT milestones using 10 year TA schedule
- Prioritize, resource and fund programs based on milestone alignment

Cost Tracking After Scope Freeze

Lost visibility regarding cost of work approved by DRB and Core Team after scope freeze

Examples

- Leadership team approves work that expands in scope (MK-1900, LVO54, obsolete relief valves and GHT tie in)
- Core team approves work that expands scope (E-432, 435)
- Non-worklist items (back page costs)

Impact

- Scope creep can be in \$Millions (D&R \$2.3MM, RLOP \$1.4MM)
- No one knows what we are spending until the last minute due to multiple approvals
- D&R cost grew from \$28MM to \$31MM between scope freeze & pull feed
- Extra work and contingency budgets spent before execution

Recommendations

- Establish refinery template for cost associated with creep (after scope freeze to pull feed)
- Report cost associated with creep to management on a bi-weekly basis

QA and PSSR Execution

Inconsistent execution of QA and PSSR processes

Examples

Plus

- A-train and FCC major

Delta

- Phase 5 and 6 QA process deviated from plan
- RACI not clearly communicated
- Training inadequate for core team and QA personnel
- Transition from completed jobs to PSSR vague

Impact

- Loose bolt-ups, wrong gaskets, leaks on start-up
- Confusion on guidance and resource requirements
- PSSR job walks were conducted before final QA
- Recovery plan -> 100% audits

Recommendations

- Execute process as proven during FCC major
- Train Core Team / QA team on RACI
- Build audit plans early w/buy-in from Operations
- Resource QA team to improve QA -> PSSR transition

Quick Win Recommendations

1. Increase the capacity of PSM/91 Gate training (Development)
2. BATC reciprocity/Improve coordination of training with start work dates (Maint)
3. Focus on supervision as key indicator of contractor consistency (Maint)
4. Stay close to contractor proven core competency (Maint)
5. Utilize CSR evaluation format as clearinghouse for contractor comments (Maint)
6. Select a single scaffolding standard (HES)
7. Establish consistent, refinery-wide formats for P3, EWO/ITC and TA database (Maint)
8. Establish parameters for incorporating selected routine work into TA window (Maint)
9. Implement RLOP permit expediter model (Ops)